FLUKE®

Instruction Sheet

Model 82RF

High Frequency Probe

INTRODUCTION

The Model 82RF (Figure 1) is a high frequency accessory probe designed to convert a dc voltmeter into a high frequency (100 kHz to 500 MHz) ac voltmeter. Conversion from ac-to-dc is accomplished on a 1:1 basis and includes a range of 0.25 to 30V rms. The probe's dc output is calibrated to be equivalent to the rms value of a sine wave input.

SPECIFICATIONS

Frequency Response*
(Relative to AC-to-DC Transfer Ratio):
100 kHz to 200 MHz ±1 dB
200 MHz to 500 MHz ±3 dB
AC-to-DC Transfer Ratio* (23 ±5°C):

RMS Input (10 MHz)	DC OUTPUT
0.25 to 0.5V	0.25 to 0.5V ±1.5 dB
0.5 to 2.0V	0.5 to 2.0V ±0.5 dB
2.0 to 5.0V	2.0 to 5.0V ±1.0 dB
5.0 to 30V	5.0 to 30V ±1.5 dB

*Frequency response and ac-to-dc transfer ratio specifications assume the use of the probe's BNC adapter and a probe output termination of 10 MΩ ±10% shunted by less than 200 pF.

Extended Frequency Response: Useful for relative readings from 20 kHz to 700 MHz.
Response: Responds to peak value of input, and is calibrated to read rms value of a sine wave.
Voltage Range: 0.25 to 30V rms.
Maximum Input Voltage: 30V rms, 200V dc.
Input Impedance: 2 MΩ shunted by <10 pF.
Temperature Coefficient: ≤0.1 of ac-to-dc transfer ratio specification per °C.

Output Connector: Fits standard 0.75 inch spaced dual banana connectors.
Accessory Connector: Slip-on BNC adapter is provided with probe.

VOLTMETER COMPATIBILITY

The 82RF is compatible with any dc voltmeter that has an input resistance of 10 MΩ ±10%. Voltmeters with higher input resistances can be used if an external shunt is placed across their input terminals. The shunt value is selected to reduce the input resistance to 10 MΩ and is determined as follows:

$$Rs = \frac{Rm \cdot 10}{Rm - 10}$$

Where:

Rs = shunted resistance in MΩ.
Rm = voltmeter input resistance in MΩ (>10 MΩ).

Example:

If Rm = 100 MΩ,

$$Rs = \frac{100 \cdot 10}{100 - 10} = \frac{1000}{90} = 11.1\ M\Omega$$

OPERATION

Use the following procedure to operate the 82 RF Probe:

1. Select and energize a compatible voltmeter.

2. Equip the voltmeter with a suitable shunt, if required. (See Voltmeter Compability.)

3. Select an appropriate voltage range (1V dc reading per 1V rms input).

4. Connect the probe's output connector to the voltmeter's input terminals (LO to low input).

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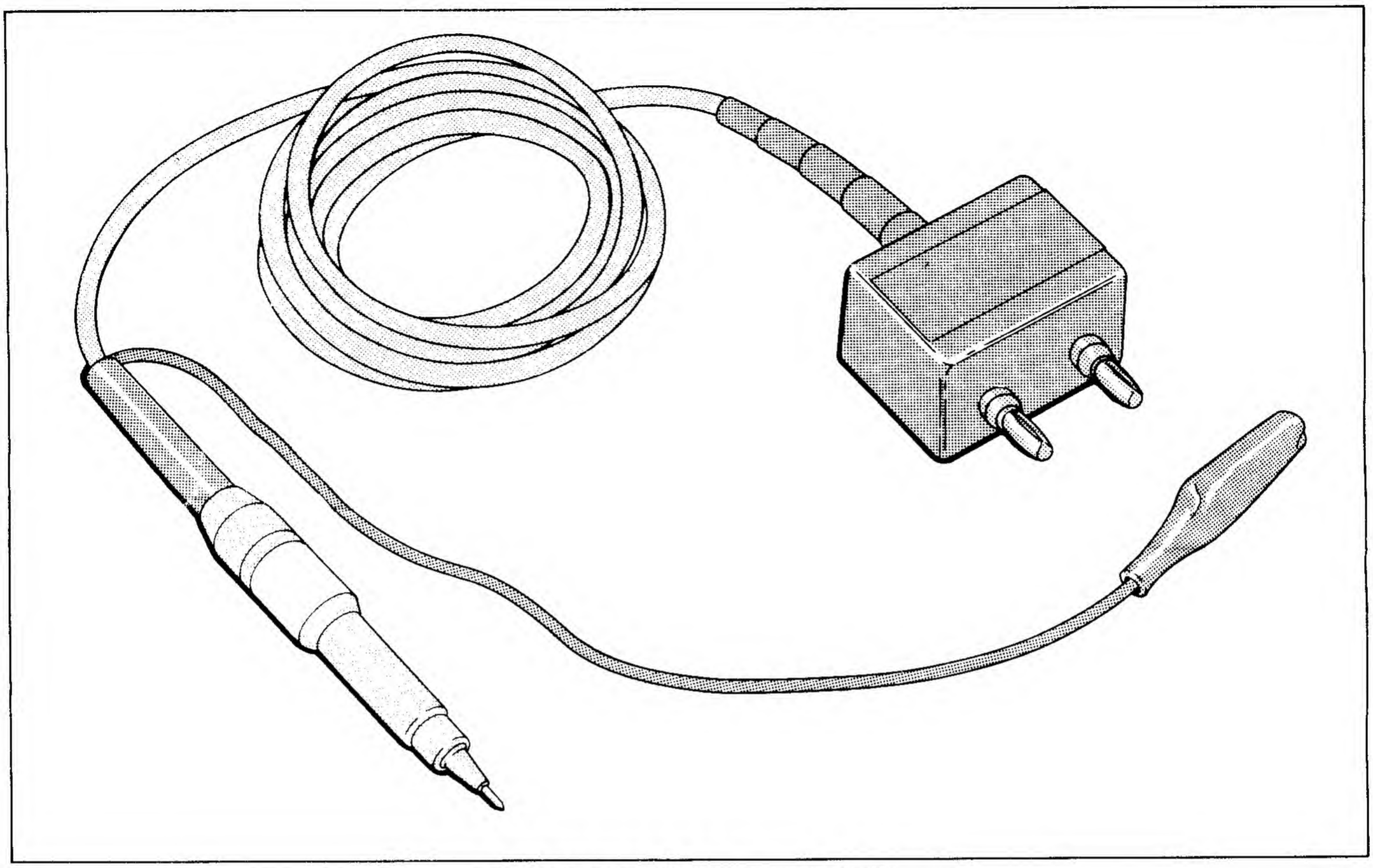

Figure 1. 82RF High Frequency Probe

5. Connect the probe's ground lead to signal common.

CAUTION

To avoid short circuit damage, never connect the probe ground lead to a potential other than ground unless the voltmeter is equipped with a floating low input (i.e., not grounded).

6. Contact the measurement point with the probe tip and read the rms voltage level directly from the voltmeter. Measurements above 100 MHz require the use of the BNC adapter and a terminated system.

CAUTION

To avoid probe damage the dc components or the input signal must not exceed 200 volts, including transients. 30V ac rms and 200V dc are the maximum inputs to the probe. These specifications allow measurements of an ac signal riding on a dc voltage of up to 200V. When this type of measurement is being made, the input capacitor will charge to the peak value of ac plus dc. If the dc level is then changed by more than 200V, the resulting transient may damage the probe. The chance of damage can be minimized by discharging the input capacitor at the end of each measurement. This is done by momentarily touching the probe tip to the ground clip.

THEORY OF OPERATION

Circuitry within the 82RF consists of a capacitor-coupled rectifier circuit which responds to the peak value of the input waveform. The output is positive polarity dc voltage which is calibrated to be equivalent to the rms value of a sine wave input. See Figure 2. Resistors, R1, R2 and R3 are selected to properly scale the dc output when connected across a dc voltmeter having a 10 MΩ input resistance.

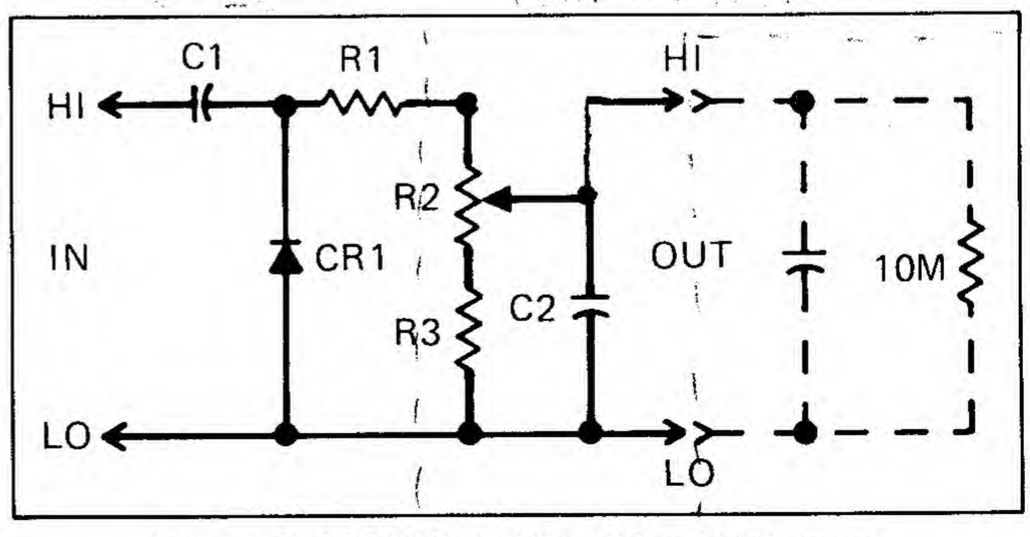

Figure 2. 82RF Simplified Circuit Diagram

MAINTENANCE

Calibration Adjustment

The following procedure assumes the use of the equipment (or equivalent) listed in Table 1. Make sure that the DMM has an input impedance of 10 MΩ ±10% shunted by less than 200 pF.

1. Complete the test set-up shown in Figure 3.

2. Set the DMM to read 2.00V dc.

NOTE

Accurate results cannot be obtained unless the signal is terminated with 50Ω near the measurement point.

3. Program the signal generator for an output of 10 MHz at a level of 1.00V rms, TERM. (50Ω instrument).

4. Check the DMM reading. it should be between +0.95 and 1.05V dc. If the reading is within limits, calibration adjustment is not required. Complete the remaining steps if adjustment is necessary.

5. The calibration adjustment is located in the DMM connector portion of the 82RF. Refer to Figure 4 and access the adjustment using the appropriate procedure.

6. Using a plastic adjusting tool, adjust the calibration pot for a DMM reading of 1.00V.

7. Reassemble the probe and verify that the DMM reading is still within limits.

Cleaning

Use a soft cloth dampened in a mild solution of detergent and water to clean the 82RF. Do not use solvents.

Table 1. List of Recommended Test Equipment

INSTRUMENT TYPE	REQUIRED CHARACTERISTICS	RECOMMENDED MODEL
RF Signal Generator	Output Frequency: 10 MHz Output Amplitude: 1V rms into 50Ω Output Amplitude Accuracy: ±2%	Fluke 6011A
Precision Termination	50Ω ±0.5%, 0.5W or greater	General Radio 874-W50B
BNC Adapter	GR874 to BNC	General Radio 874-QBPA
BNC Tee	Jack-Plug-Jack	Pomona Model 3285
Digital Voltmeter	DC Accuracy ±.25% or better 3½ digit display Capable of measuring up to 2V dc Input impedance 10 MΩ ±10% shunted by <200 pF	Fluke 8020A

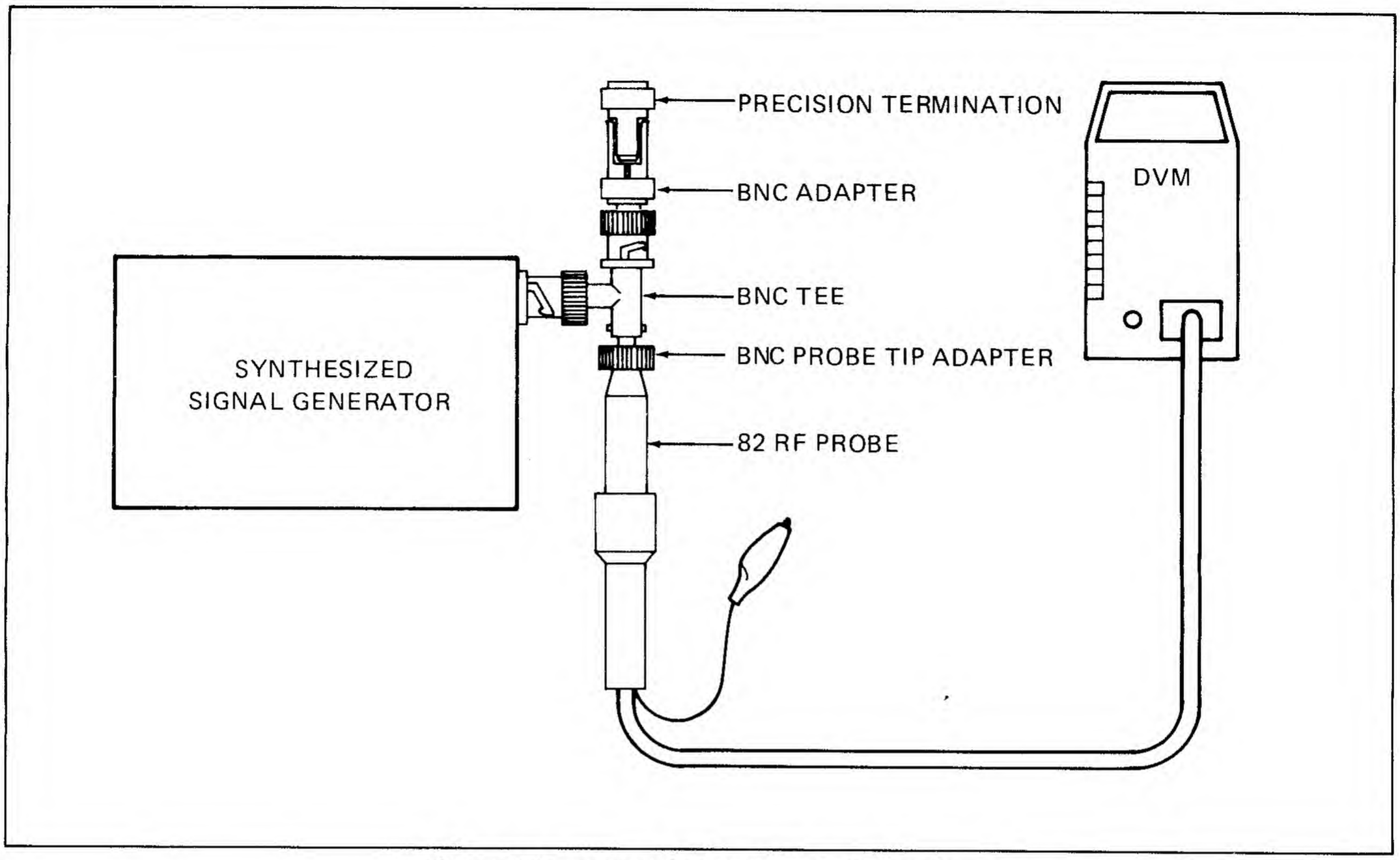

Figure 3. Equipment Connections for Calibration

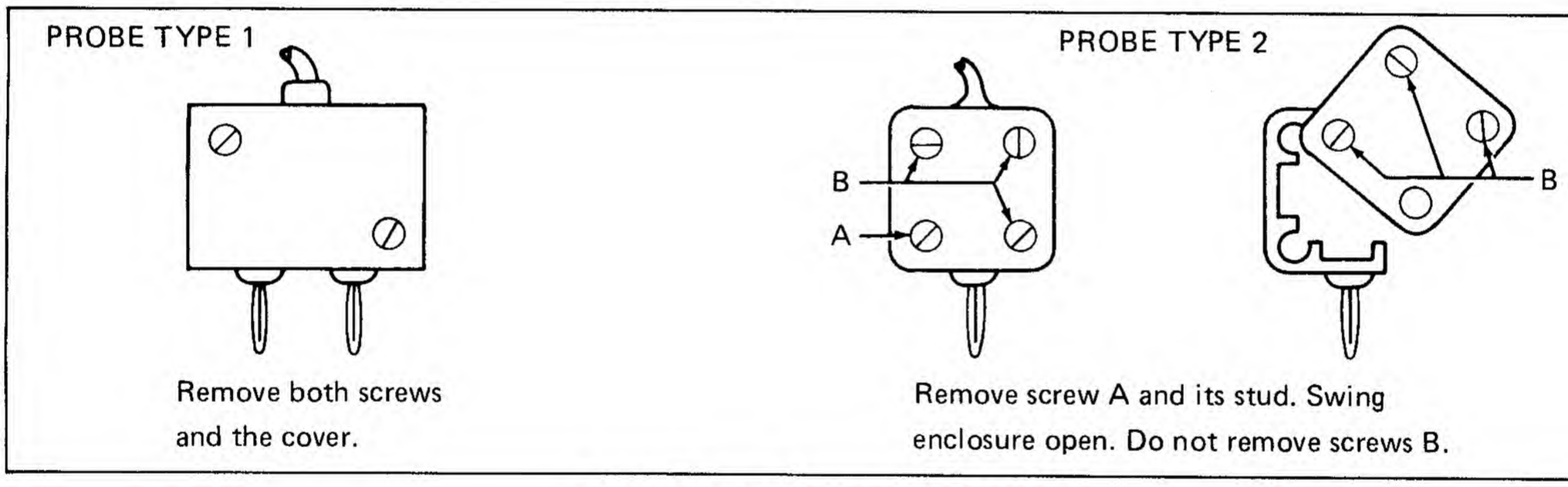

Figure 4. Adjustment Access Details

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